PATENT SPECIFICATION

THE PATENT OFFICE LONDON

DRAWINGS ATTACHED

818,835

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International Classification:—B63b, F25j.

COMPLETE SPECIFICATION

Improvements in or relating to Tankers

WE, N. V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ, a company organised under the laws of The Netherlands, of 30 Carel van Bylandtlaan, The Hague, The Netherlands, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to tankers of the type provided with at least one group of internally lined, cylindrical tanks positioned along a fore-and-aft line, the longitudinal axis of which tanks are parallel to or coincident with the longitudinal axis of the vessel and the tanks being integral with the structure of the vessel. Tankers of this type will be referred to in this specification as tankers of the type specified.

A tanker of the type specified is described in the British patent specification No. 106,351. This known tanker is designed for carrying sulphuric acid, for which purpose the tanks are internally lined with a corrosion-resistant material.

An object of the present invention is to provide tankers of the type specified which can be used for transporting gases such as liquefied butane, propane, ethane and methane or mixtures thereof.

According to the present invention a tanker of the type specified is provided with transverse and longitudinal web frames, to which the cylindrical circumferences of the tanks are connected, the tanks having flat end-walls formed by the transverse double-walled cofferdams of the vessel.

When transporting liquefied gases stored in tanks the vapour pressure of these substances is maintained at a pressure which is as little as possible above the atmospheric pressure by keeping the temperature of the liquid in the tanks at a low value. As the low temperature of the liquid in the tanks would cause the metal of the tanks and any stiffeners of the tanks to become brittle, and this would impair the strength, it is desirable to ensure that the liquid is unable to come into contact with the tank walls or stiffeners thereof. This may be done by giving the tanks a smooth interior and arranging the stifferers on the outside of the tanks and the necessary heat insulating material on the inside of the tank walls. Balsa wood is a suitable material for lining the inside of liquefied gas tanks. The occurrence of a slight leakage in the insulation can, however, occur. The possibility of establishing at any time the occurrence of leakage in the insulation is therefore desirable. This is possible if the tanks are built in in such a way that all exterior surfaces of the tanks are open to inspection, since, if the insulation of the tanks is damaged, the cold liquid in the tanks at the side of the damage comes into contact with the tank wall, with the result that a cold spot appears on the outside of the tank wall. If the outsides of the tank are open to inspection it is thus always possible to discover damage to the insulation and take any precautions necessary. An effective stiffening of the tanks is, of course, also very important, since deformations of the tank walls caused by the liquid pressure and vapour pressure, or of the tanks as a whole, may damage the insulating layer.

Tankers according to the present invention are constructed in such a way that the tanks are always accessible at all points on the outside and are so stiffened and supported that deformations of the tanks or tank walls are reduced to a minimum. A construction is also aimed at which enhances the stiffness of the vessel itself, so that deformations of the tanks caused by deformations of the vessel will also be as small as possible. The double-walled cofferdams facilitate inspection of the outside of the end-walls of the tanks and give these end-walls great rigidity. Despite the fact that each end-wall is flat

[*Price* 3/6]

Price 4s 6d

since it forms part of a cofferdam, each end-wall is sufficiently stiffened so that it may also be used in the case of large-diameter tanks. A further benefit of these flat end-walls is that the insulating layer can be applied without great difficulty.

If desired, there may be provided only a single group of tanks, their axes in this case usually being coincident with that of the vessel. In the case of larger vessels, however, this arrangement gives rise to problems in designing and constructing the tanks, and it is therefore usually preferable to employ several groups of tanks suitably spaced over the transverse cross-section of the vessel. In this connection attention is drawn to the fact that where reference is made in the specification or claims to a group of tanks, this should always be understood to mean a plurality of tanks having a common longitudinal axis which is parallel to or coincident with the longitudinal axis of the tanker.

Tankers according to the present invention will now be described by way of example with reference to the accompany drawings in which:

Fig. 1 shows a transverse cross-section of a tanker with four groups of tanks (the right-hand half showing a cross-section at some distance from a cofferdam, e.g., at the line I—I in Fig. 2, and the left-hand half showing a cross-section at a cofferdam, e.g., at the line I^1—I^1 in Fig. 2);

Fig. 2 shows a vertical longitudinal cross-section of two tanks, at the line II—II in Fig. 1;

Fig. 3 shows a horizontal cross-section of one tank, at the line III—III in Fig. 1;

Fig. 4 shows, diagrammatically and on a smaller scale, a vertical longitudinal cross-section of the part of the tanker containing the tanks; and

Figs. 5—8 show the same sections of a tanker with only one group of tanks, the section lines V—V, V^1—V^1, and VII—VII in Figs. 5, 6 and 7 corresponding to the section lines I—I, I^1—I^1, II—II, and III—III respectively in Figs. 1 to 3.

Since in principle the two tankers differ only in that one has only one group of tanks and the other has four groups, the corresponding parts in the two groups of figures bear the same reference numbers, and the following description relates to both embodiments.

The skin of the tanker is denoted by the numeral 2 and the transverse web frames of the ship's hull by the numeral 1. Cylindrical tanks 3, internally lined with a layer of heat-insulating material 7, are arranged in circular openings in the transverse web frames 1 and are connected to the transverse web frames 1, for example, by welding or riveting, along their entire circular periphery. Most of the longitudinal web frames 5 are connected to both the transverse web frames 1 and the outside of the tank 3. The ends of the tanks 3 are formed by the plates 12 of the cofferdams 9. Each cofferdam 9 consists of two parallel plates 12 connected together by web frames 13. The parallel plates 12 are far enough removed from each other to give the cofferdam sufficient rigidity and to render the inside of the cofferdam 9 accessible for inspection. To enable inspection of the cylindrical walls of the tanks to be carried out also, the longitudinal web frames 5 are provided with manholes 15. Holes 4 are also arranged in the transverse web frames 1. In order to prevent the temperature in the cofferdams from becoming too low, which could be detrimental to the metal of which the cofferdams are constructed, it is advisable to connect the inside of the cofferdams with the outside air, for example, by means of ventilation openings (not shown).

In the embodiments shown in the drawings there are either one or four groups of cylindrical tanks but it is also possible, of course, to use two or three or more than four groups of cylindrical tanks.

WHAT WE CLAIM IS:—

1. A tanker of the type specified which is provided with transverse and longitudinal web frames, to which the cylindrical circumferences of the tanks are connected, the tanks having flat end-walls formed by the transverse double-walled cofferdams of the vessel.

2. A tanker according to claim 1, in which the tanks are internally lined with balsa wood.

3. A tanker substantially as hereinbefore described with reference to either Figs. 1—4, or Figs. 5—8 of the accompanying drawings.

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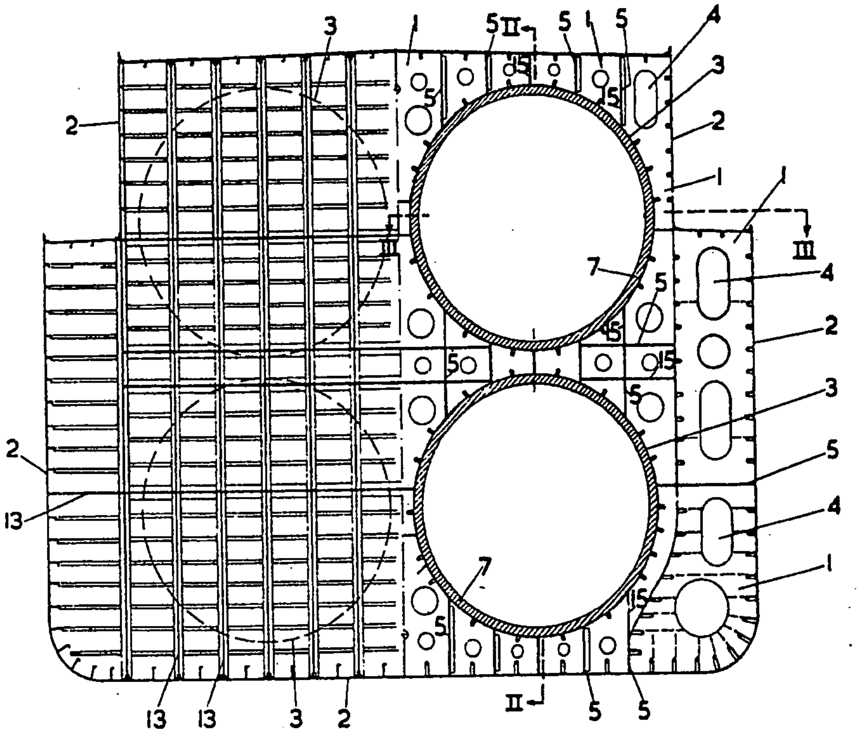
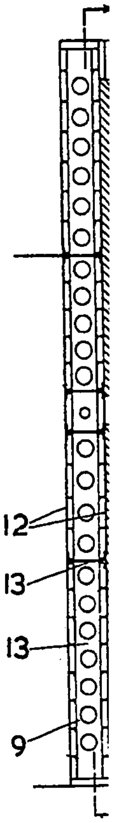


I'-I' Fig.1 I-I



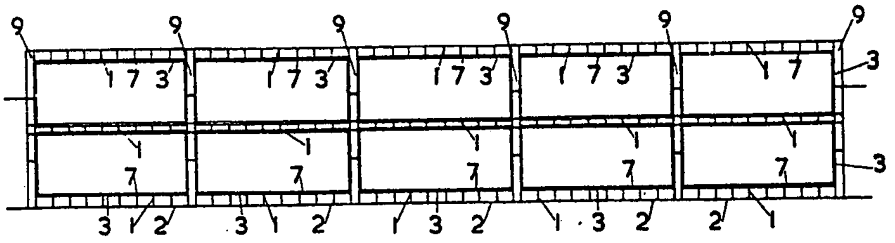
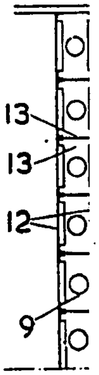


Fig. 4



818,835 COMPLETE SPECIFICATION

4 SHEETS *This drawing is a reproduction of the Original on a reduced scale.*

SHEETS 1 & 2

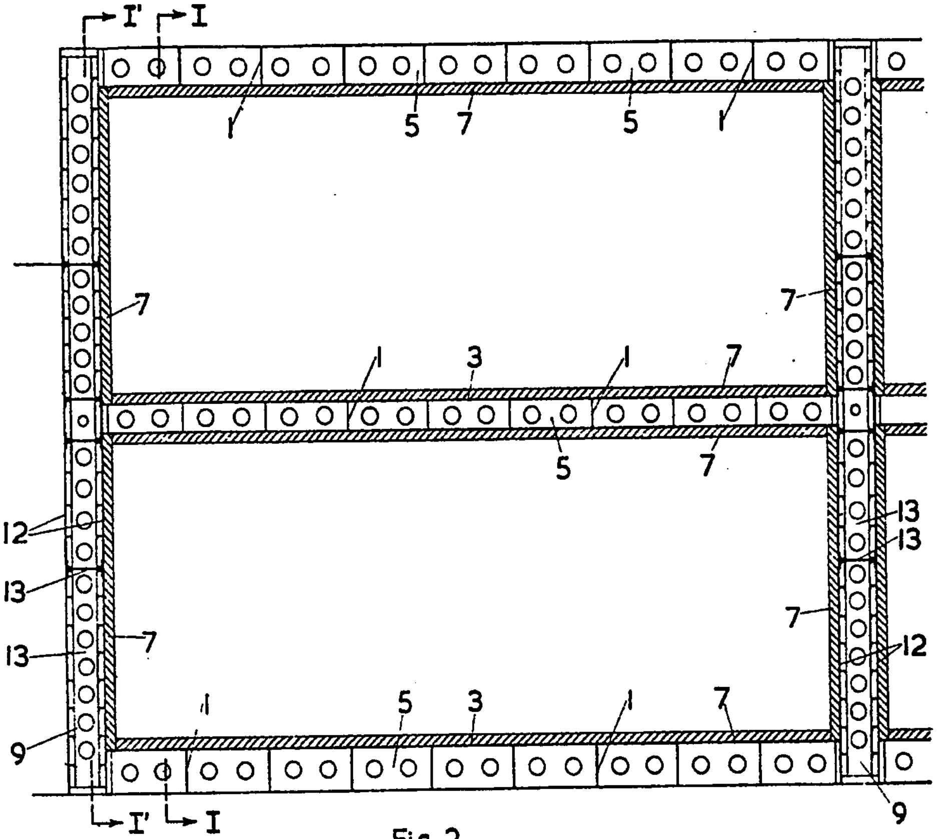


Fig. 2

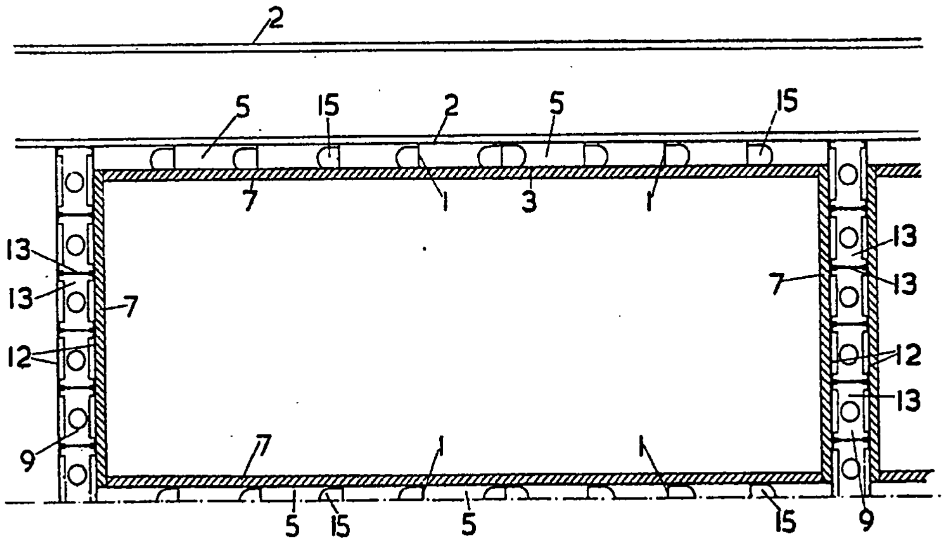


Fig. 3

818,835 COMPLETE SPECIFICATION
4 SHEETS *This drawing is a reproduction of the Original on a reduced scale.*
SHEETS 1 & 2

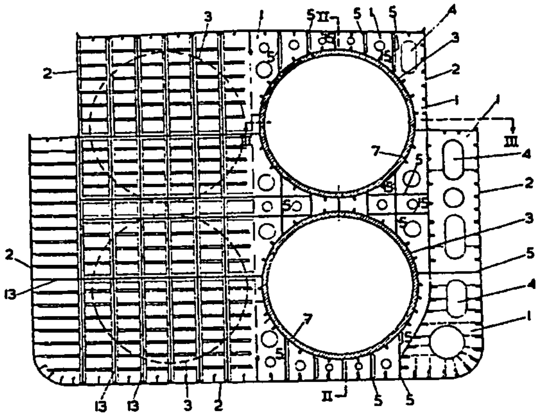


Fig.1

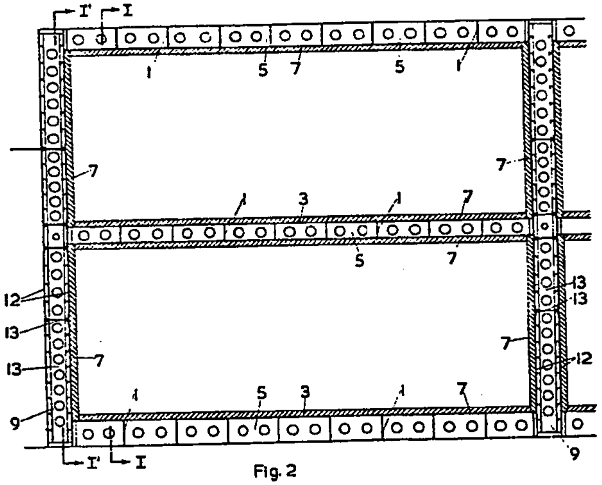


Fig. 2

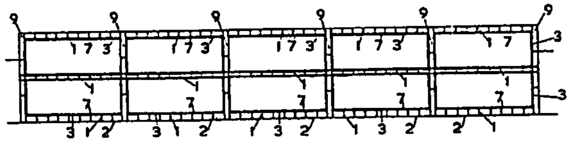


Fig. 4

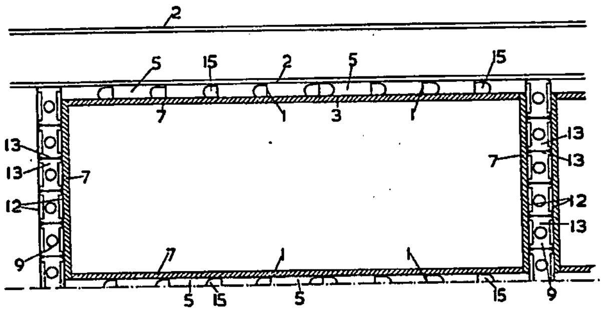
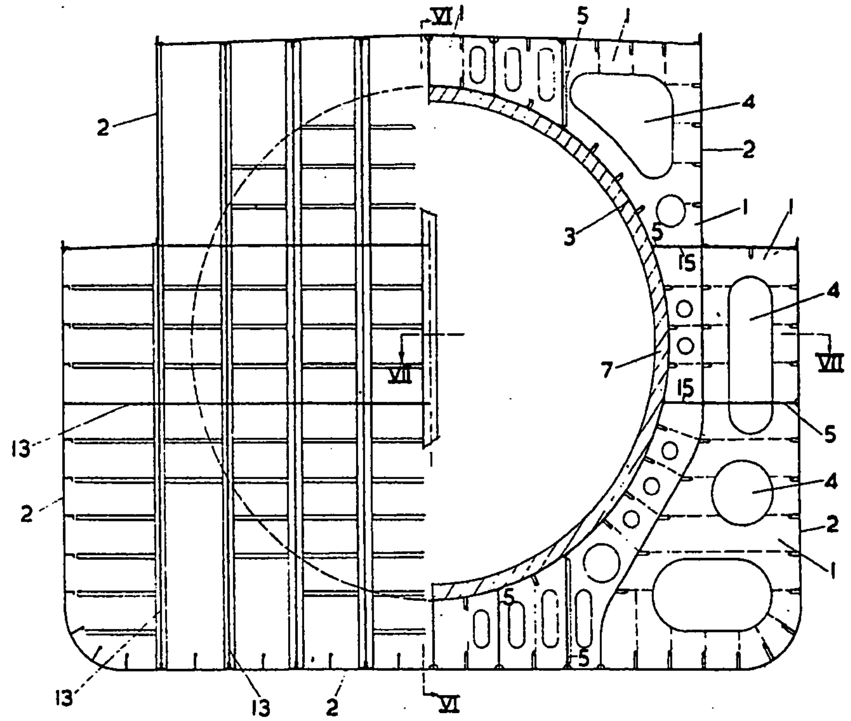


Fig.3



V-V Fig.5 V-V

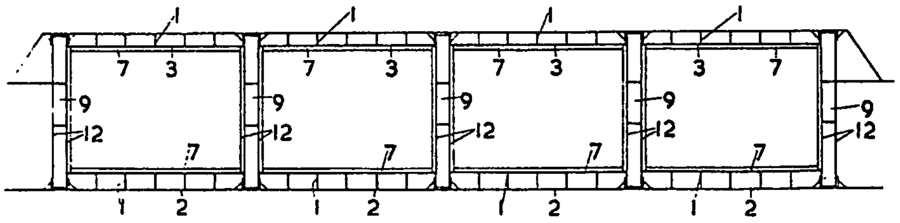


Fig.8

818,835 **COMPLETE SPECIFICATION**

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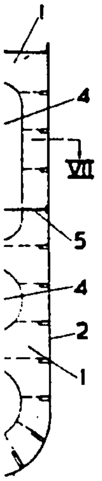
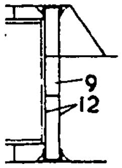
SHEETS 3 & 4





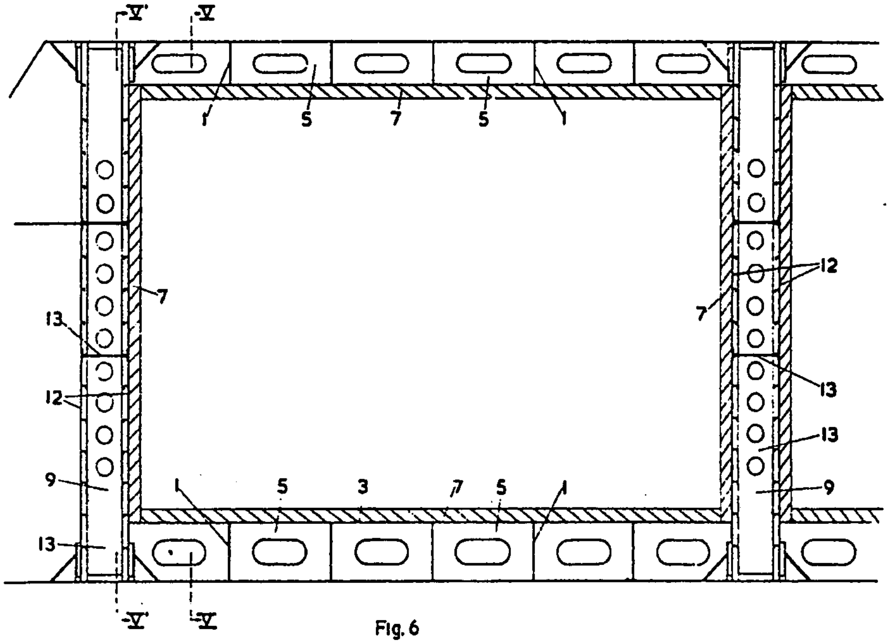


Fig. 6

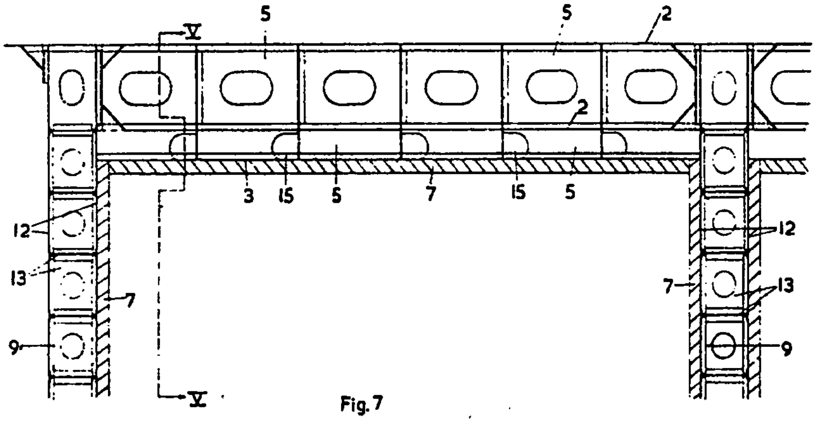


Fig. 7

818,835 COMPLETE SPECIFICATION

4 SHEETS *This drawing is a reproduction of the Original on a reduced scale.*

SHEETS 3 & 4

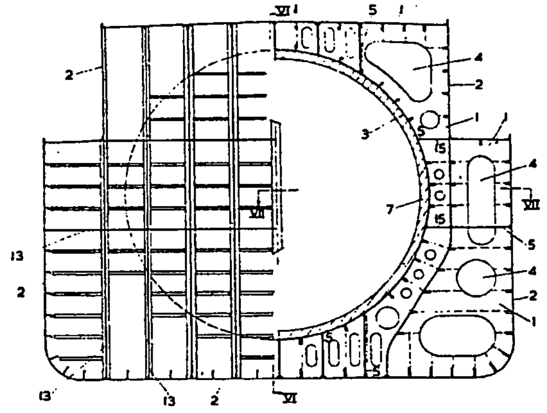


Fig. 5

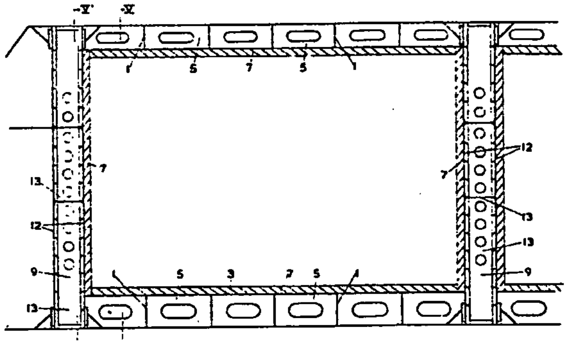


Fig. 6

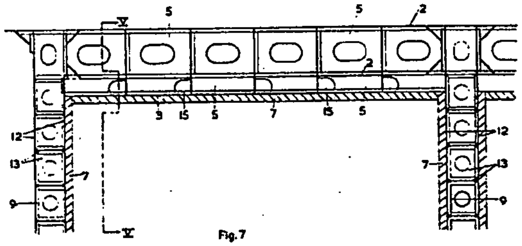


Fig. 7

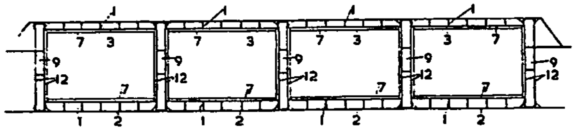


Fig. 8